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1.—Two xerophytic new species of *Ptilotus* (Amaranthaceae) from  
Western Australia

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Abstract

Two new species of *Ptilotus*, *Pt. royceanus* and *Pt. mollis*, from Western Australia are described and illustrated; the holotypes, housed at PERTH, are cited. Critical notes are made on some particular characters of the new taxa which are compared with previously described species, as well as with each other.

Introduction

By the courtesy of Mr. R. D. Royce (Government of Western Australia, Department of Agriculture) two new taxa of the genus *Ptilotus* came to my hands, one of which was recently gathered by Mr. A. S. George in the central Australian desert, the other preserved for more than 25 years as an indeterminate ("*Trichinium*, ? sp. nov.", N. T. Burbidge) in the Western Australian Herbarium.

Both species are very drought-resistant plants with an extremely dense pubescence covering stems branches and leaves as well as bracts and the ovary.

1. *Ptilotus royceanus* Benl, sp. nov.

*Descriptio*.—Fruticulus (rosei-)niveus ad 50 cm altus, ex fissuris rupis oriens et valde diffusus (Fig. 2). Caules lignosi virgati, primo stricti-erecti, postea arcuati, demum dependentes 0,5 cm et ultra diametro, multiramosi; rami ramulique numerosi erecte patuli vel curvati, subfastigiati, per totam longitudinem foliati (Fig. 1a), vetustiores apicem versus saepius pedunculum et rhachidem spicarum formantes (Fig. 1b); omnes tomento albidilanuginoso vestiti, pilis tortuosis, densissime intricatis; ramuli floriferi post deflorationem glabrescentes et apice tenus multo extenuati.

Folia (Fig. 1a) integerrima opaca alterna, 1-2 cm distantia, basi pctioliformi subsessilia (laminis vix in petiolum attenuatis), carnosa—laminis utrinque semper tomento crasso pilorum ut in caulibus crisporum obsessis—

orbicularia (ad 1,2 cm diametro) vel rotundati-subovata vel late elliptica (ad 2 cm longa et 1 cm lata), apiculata, nervo medio subtus plus minusve prominente; superiora, quorum ex axillis ramuli floriferi vel flores singuli haud raro oriri solent, et summa in bracteas trans-euntia flavescenti-albida, inferiora cinerascientia. Inflorescentiae (Fig. 1b) numerosae haud amplae longe spicatae, plerumque in paniculas complures laxas congestae. Spicae singulae elongati-cylindratae, ad 15 cm et ultra longae et 1,0-1,3 cm diametro, primo pedunculati-erectae, ramos ramulosque terminantes, dein plus minusve curvatae vel flexuosae, laxi-vel remotiflorae, usu solitariae, raro minoribus lateralibus breviter pedunculatis additis, axillae foliolarum summarum vel etiam florum singulorum inorum enascentibus. Flores superiores spicae haud densius collecti, inferiores aequales dissiti 0,3-1,0 cm fere remoti (Fig. 1b), primo rosei dem pallescentes.

Bractea et bracteolae scariosae integrae plus minusve carinatae, nervo mediano colorato in acumen breve (0,2 mm longum) excurrente, pilosae pilis subcrispis remote articulatis apicem attingentibus vel paulo superantibus, inaequales: Bractea indumento abscondita rigidiuscula (oblongi-)ovata 2 - 2,3 mm longa et 1,2 - 1,6 mm lata, pellucida, (dilute) succinea, costa prominula distincte aurei-fusca, in toto dorso pilis densis ad 1,8 mm longis, margines—apicem versus interdum paululo serrulatas—ubique semper valde praestantibus vestita, post lapsum perianthii superstes. Bracteolae membranaceae tepalis adpressae, late subovatae, circiter 3 mm longae et 1,8 mm latae, in lateribus glabris hyalinis lucidis nervum flavifuscescentem versus pilis flexuosis dense obiectae.

Perianthium (Fig. 1c) tepalis divergentibus subcampanulati-patens, basi ad pseudotubum (0,4 mm) connivente extus hirsuta vix induratum. Tepala impellucida rigida integerrima

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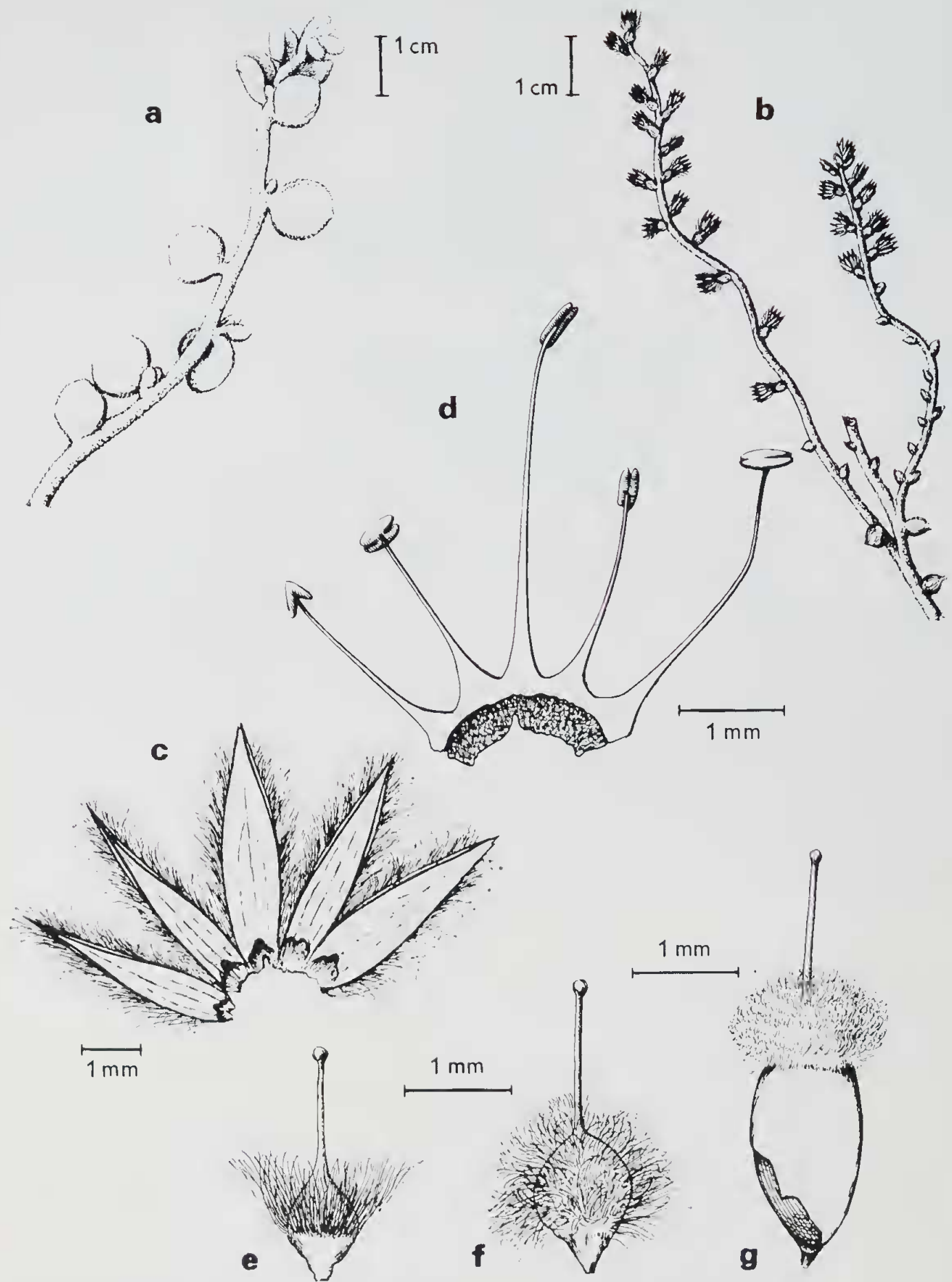


Figure 1.—*Ptilotus royceanus* Benl, sp. nov.— a = sterile part of the plant; b = fertile end of a branchlet; c = expanded perianth, inner view; d = staminal cup spread open, inner view; e, f = pistil, two stages of development; g = pistil including the almost ripe nut.



libera, sublinearia acuta, in dimidio paene inferiore distincte trinervia, in areola mediana nervis lateralibus circumscripta paulisper purpurascens, extus tota superficie—apice nudo lucido, circiter 0,4 mm longo excepto—pilosa, pilis niveis subtilibus strictis oblique erectis, articulatis, ad 2 mm longis induta, intus laevigata, glabra. 2 exteriora 5-6 mm longa et usque 1 mm lata, marginibus apice tenus plus minusve abrupte involutis, hoc modo apicem brevem imperfectum—pubescentia eundem numquam attingente—formantibus: 3 interiora subaequilonga 0,5 - 0,7 mm lata, marginibus involutis in apicem acuminatum pilis dorsalibus vix superatum sensim transeuntia.

Stamina 5, sterilia nulla (Fig. 1d), in cupulam humilem (0,1 - 0,15 mm) et planam glabram basi perianthii tantum insidentem connata; squamulis intrastamineis nullis. Filamenta dilute fulva linearia, subulata, inferne sensim ad 0,2 mm dilatata, longitudine ab 1,2 ad 3,0 mm differentia; antherae in dorso affixae flavae ellipsoideae 0,35 mm longae et 0,15 mm latae, basi leniter bilobae.

Ovarium (Fig. 1e-g) primo clavatum (circiter 0,8 mm longum), dein subglobosum (1,2 mm diametro), modice stipitatum (stipite ad 0,2 mm longo), basi excepta dense villosum, pilis 1 mm fere longis nodulosis, primo rectis, postea undulati-crispatis, fructum elongatum (circiter 2 mm) demum coronantibus; stylus centralis

1,5 mm longus, tenuis (0,06 mm diametro), glaberrimus, stigmatibus papilloso primo capitellato, dein inconspicuo.

*Holotypus speciei*.— Bungabiddy Rockhole, Walter James Range, W.A. (128° 44' E, 24° 40' S); A. S. George no. 8314, 5.X.1966. ("Much-branched perennial herb to 50 cm, growing in crevices on rock walls. Fls. pale pink.")—PERTH.

*Isotypes*: CANB, K, M, MEL, PERTH.

*Paratypes*.— Glen Cumming, Rawlinson Range, W.A. (128° 23' E, 25° 00' S); A. S. George no. 8825, 21.VII.1967. ("Much-branched perennial herb, with pale pink fls. In crevices on vertical rock walls.")—AD, B, CANB, M, NSW, PERTH.

*Habitat*.—In addition to his notes on the labels Mr. A. S. George—Western Australian Herbarium, South Perth—communicated the following data to us in a letter of 10.II.1969: This *Ptilotus* "is known from two localities in the ranges of central Australia, just west of our State border. The species always occurs on vertical rock walls in gorges, being replaced by the common *P. obovatus* where more soil has accumulated. A photograph of the plant in situ accompanies one of the collections." (see Fig. 2.)



Figure 2.—*Ptilotus royceanus* Benl.—Photograph showing the habitat of George 8825 in the Rawlinson Range.—phot. A. S. George.



*Material.*—Our description is based on the holotype, a much-branched stem measuring 40 cm up to the top and bearing more than a dozen of inflorescences, on 6 isotypes (each a less copiously flourishing branch) and on 6 samples of George's no. 8825. These paratypes are characterized by larger and somewhat darker leaves, and by a stronger branching of the floriferous parts; the flexuous spikes are richer in flowers. The differences may be explained by diverse local conditions and by the different times of collecting.\*

*Discussion.*—Apart from the dense and somewhat villous pubescence the most striking features of the newly established species ("most attractive when seen growing from the rocky walls of its habitat", A. S. George) are the usually orbicular leaves and the very elongated interrupted spikes, the number of their flowers varying exceedingly, i.e. from a few only to 30-50 a spike.

Almost orbicular laminae may occur at times in *Ptilotus obovatus* (Gaud.) F.v.Muell. var. *obovatus*, besides the ordinary spatulate and obovate ones. More often we find those orbicular leaves in *Ptilotus roei* (F.v.Muell. ex Benth.) F.v.Muell., where they are, however, distinctly pedunculate and only puberulent when young. In *Ptilotus rotundifolius* (F.v.Muell.) F.v.Muell. well-rounded thick leaves are met with in most of the specimens, and always coated with a dense tomentum of crispy hairs, in about the same way as in our taxon; but the leaves may attain diameters of 6 cm. Furthermore, none of the three species ever bears interrupted spikes but always compact ones.

More or less separated flowers are presented by *Ptilotus dissitiflorus* (F.v.Muell.) F.v.Muell. in its two varieties *dissitiflorus* and *longifolius* Benl: The 15-30 solitary flowers of the spike (up to 15 cm long) are inserted at intervals of 3-8 mm. *Ptilotus distans* (R.Br.) Poiret, too, is crowned by interrupted spikes of about the same kind, the distances of the inferior flowers measuring up to 2,3 cm. Finally, in *Ptilotus forrestii* F.v.Muell. we find the 15-30 flowers of the spike (6,5 cm) at a distance of about 1 mm from each other.

None of the three cited species bears either orbicular leaves or a pubescence as described in the present plant: The yellow rough and more distinctly jointed hairs on stems and leaves in *Ptilotus forrestii* are crispy, too, but scarcely intricate. *Ptilotus distans* completely lacks pubescence, and in *dissitiflorus* the indumentum of dendroid hairs becomes deciduous in

older stages of the plant. Moreover, each of the three species has a dissimilar appearance in its general stature and differs markedly in the structure of its flowers.

Thus *Ptilotus royceanus* is sharply separated from all forms previously described, undoubtedly being a really distinctive species.

*Name.*—The specific epithet of the new plant was given in honour of Mr. Robert D. Royce, having been active since 1933 in the Department of Agriculture of Western Australia; in 1960 he became Curator of the Herbarium succeeding Mr. C. A. Gardner. Since 1945 he has made numerous collecting trips, exploring excursions and surveys in Western Australia.

Mr. Royce was kind enough to let me have access to the rich collections of *Ptilotus* in his herbarium and to send me the many hundreds of sheets over a period of time, thus enabling me to continue my studies. Furthermore, a considerable number of duplicates were generously given by him to our Botanische Staatssammlung.

## 2. *Ptilotus mollis* Benl, sp. nov.

*Descriptio.*—Planta perennis manifesto fruticulosa indumento permolli ornata est. Rami floriferi suberecti foliosi, ramulis ex axillis orientibus abunde praediti, sordide flavidi, 20 cm et ultra longi, 5 mm et ultra diametro, lanuginosi-tomentosi, pilis albis tenuibus remote nodulosis circiter 2,5 mm longis, eximie crispatis et densissime intertextis, tegmentum continuum crassissimum (ad 1 mm) formantibus, petiolos eodem modo inducentibus.

Folia alterna 0,5-1,2 cm distantia, integra, indumento crassa, argenteo-nitida, primo subobovata dein spatulata (Fig. 3a) apiculata-laminis in specimine examinato ad 2,2 cm longis et 1,3 cm latis, gradatim in petiolum distinctum (ad 0,6 cm) contractis, utrimque pubescentia luxuriosa absconditis, pilis suberectis adpressis tenerrime sericeis visu laevibus (imperfecte articulatis) ad 3 mm longis, partem totam superiorem et dimidium fere apicale partis inferioris laminarum tegentibus, petiolo tenuis in pilos crispas transeuntibus.

Spicae inconspicuae axillares (Fig. 3a)—spica una demum terminante excepta—breviter pedunculatae (pedunculo 4 mm fere longo, interdum duobus foliis parvis onusto), hoc modo in racemum congestae; late obtuseque pyramidales, in specimine exstante 0,6-1,0 cm longae et 0,7-1,0 cm latae, spica terminali paulo maiore. Flores singuli (circiter 25) sub pelle pilorum albidorum bractee bracteolarumque et perianthii absconditi vix cerni possunt.

Bracteolae cum bractea scariosae costatae, nervo medio prominente flavo vel subfusco vix producto, apice plus minusve acutiusculo, pilis dorsalibus ad 3 mm longis, basim versus (sub-) undulatis nodulosis semper superato, inaequales: Bracteolae membranaceae (Fig. 3c) ventricosae (rotundati-)ovatae 2,5-2,8 mm longae, ad 2 mm latae, integerrimae, in lateribus glabris hyalinis nitidis, pubescentia in tertiam mediam restricta, tepalis arcte adpressae. Bractea in-

\* Among a collection of duplicates of *Ptilotus*, recently (2.II.1970) sent to us by Mr. J. R. Maconochie (Arid Zone Research Institute, Animal Industry and Agriculture Branch, Northern Territory Administration, Alice Springs, N.T.) an undetermined specimen (Gorge, 1 mile E. Ewalinga Rock-hole, Petermann Ranges; J. R. Maconochie no. 780. 19.IX.1969.—N.T. 25069) was included, which proved to be identical with our new species. It matches well some of Mr. George's samples, and its locality belongs to the same area where George's plants came from. J. R. Maconochie notes: "Perennial shrub to 12" high, leaves orbicular, soft and having woolly-textured surface, inflorescence an open spike each floret pink. Growing in crevices of rocks in gorge where hillside almost vertical."

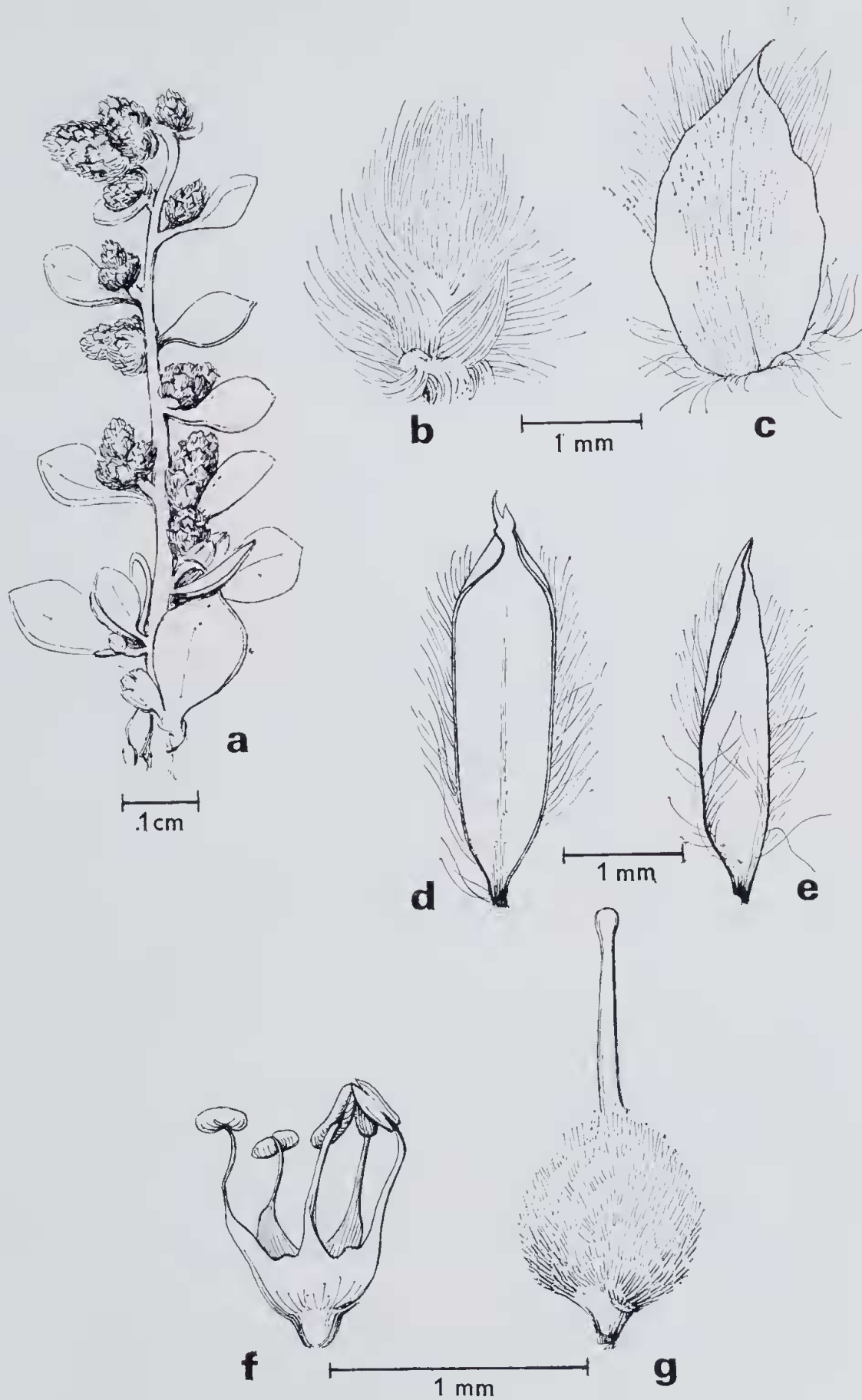


Figure 3.—*Ptilotus mollis* Benl, sp. nov.— a = terminal piece of a floriferous branch; b = bract, outer view; c = practeole, inner view; d = outer perianth-segment and e = inner perianth segment (both inner view); f = staminal cup; g = pistil.



ferior rigidior, oblongi-ovata vel ovati-lanceolata 2,2 - 3 mm longa et circiter 1 mm lata, in tergo omnino densissime villosula (Fig. 3b), margine apicem versus interdum subserrulata.

Perianthium rigidi-erectum, postea aliquantum aperiens, basi constricta parce induratum. Tepala libera in pseudotubum brevem (0,15 - 0,2 mm) conniventia, scariosi-flavescentia, basi plus minusve distincte trinervia et subcarinata, extus praeter apicem glabrum saepe praerupte angustatum (0,2—0,3 mm) pilis albis strictis ad 1,8 mm longis haud conspicue articulatis, apicem non attingentibus copiose vestita, haud (vix) limbata, intus laevigata, inaequalia; 2 extima lincari-elliptica (Fig. 3d) ad 3,5 mm longa et 1 mm lata, apice haud raro visu bi-(tri-)furcato, 3 interiora sublanceolata (Fig. 3e) vix breviora, sed angustiora (0,6 mm) supra basim interdum nonnullis pilis marginalibus introflexis obsessa, apice plerumque peracuta.

Stamina 5, omnia fertilia, cupulam turbinatam membranaceam subglabram conspicuam (circiter 0,3 mm altam) liberam formantia (Fig. 3f); pseudostaminodiis interiectis nullis. Filamenta ad 0,45 mm longa ligulata, superne subulata, inferne gradatim et modice dilatata (0,1 mm). Antherac dorsifixae rufescentes, sublineares vel ellipticae 0,2 mm fere longae.

Ovarium subglobosum, breviter stipitatum ad 0,8 mm. longum (stipite 0,15 mm fere longo incluso), echinatum, pilis breviter setaceis (0,1 - 0,2 mm) praeter stipitem omnino vestitum (Fig. 3g). Stylus centralis glaberrimus, eadem longitudine vel paulo longior et 0,1 mm diametro; stigma minutissimum.

*Holotypus speciei*.—Gorge Range†, Warralong Station, W.A. ("Growing as an erect small undershrub amongst loose boulders"); N. T. Burbidge no. 780; May 1941.—PERTH.

*Material*.—The sheet containing only one branched top of a stem (21 cm high), it was natural to assume that further parts of the plant might be in the possession of the collector or of one of the institutes supplied by her with specimens. With regard to this Dr. Nancy T. Burbidge expressed herself in a letter of 9.V.1969 as follows: "The *Ptilotus* specimen from Warralong (my 780), was obtained while I was working on a research grant at the University of Western Australia. Later, when I moved to South Australia, the plant collection was given to the State Herbarium from which Mr. Royce has forwarded material. So far as I know none of the collection is now held at the University. I did not retain any myself . . . It is possible that there was only enough of the specimen to make a single sheet. There is no reason why the sheet you have should not be made the holotype."

*Habitat*.—Ecological notes about the area in which the plant had been gathered were published by Dr. Burbidge in Journ. Roy. Soc. W. Austr. 29: 151-161 (1942-43, issued 1945), where Figure 2 of Plate II gives an idea of the terrain where *Ptilotus mollis* was (or possibly is still) growing.

† The Gorge Range is a chain of hills between the Shaw and the Coongan Rivers within the granitic De Gray—Coongan plain, with its semi-arid climate.

*Discussion*.—Never before has such a conspicuously dense indumentum of crisped hairs as that covering the branches and branchlets of the above taxon been found on any *Ptilotus* species.

The soft woolly coat continues over the peduncle into the lamina, giving way, especially on the upper surface, to long straight fine hairs which give the leaf a peculiar silver-gray silky brightness reminiscent of the considerably narrower and by far more crowded leaves of *Ptilotus helichrysoides* F.v.Muell. This species is primarily different because of its cushion-forming growth, and the velvety pubescence consisting entirely of more or less straight hairs. With regard to the floral structure the two taxa only agree in the 5 equally long and fertile stamens as well as in the densely hairy ovary; but in any other detail, especially their proportions, they differ markedly from each other.

As regards the thickness of the indumentum on branches and leaves, among the well-known species *Ptilotus incanus* (R.Br.) Poiret (in its var. *incanus*) does resemble our new plant at first sight; yet its pubescence consists of dendroid hairs, and no closer relationship is to be considered, the inflorescences looking absolutely different. The same can be said about *Ptilotus obovatus* (Gaud.) F.v.Muell., which (in its varieties *obovatus* and *griseus* Benl) has at times a rather thick cover of dendroid and stellate hairs, respectively. In *Ptilotus rotundifolius* F.v.Muell. the woolly indumentum of the stem is composed of fine crispy hairs, and the pubescence of the leaves may become rather thick; but the terminal spikes of this species will actually reach a length of 12 cm and a diameter of 4 cm, giving the plant quite a different habit.

With regard to the kind of indumentum *Ptilotus mollis* bears a striking likeness to the above taxon, *Ptilotus royceanus*. There, too, stems and leaves are covered by a—though somewhat thinner—layer of crispy and intricate hairs; the bracts being completely concealed by their dorsal woolly fur, the ovary uncommonly pilose. In spite of those traits of resemblance a closer relationship is not to be assumed either, as in *Ptilotus mollis* the flowers form a densely crowded spike, whilst in *Ptilotus royceanus* they are inserted increasingly remote, up to a distance of 1 cm from one another.

The general facies of the new taxa can hardly be compared with each other, *Ptilotus mollis* being represented by a mere fragment. At least we are able to conclude from Dr. Burbidge's notes that small bushes of the plant collected by her are growing upright between boulders in creeks, where *Ficus platypoda*, *Ficus orbicularis*, *Terminalia circumalata*, *Acacia trachycarpa*, *Corchorus parviflorus* var. *ovatus* and *Ptilotus auriculifolius* are also to be found, as well as an occasional Eucalypt. In contrast to this situation *Ptilotus royceanus*, a more or less hanging subshrub, seems to be dependent on vertical walls within some ranges of the central Australian desert (Fig. 2).

*Ptilotus mollis* is quite unlike all other species hitherto known, thus representing a well distinguishable taxon.